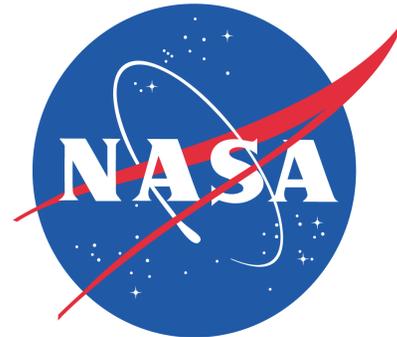


*Development Of A Globally Consistent Aqua  
MODIS Fluorescence Line Height (FLH) Record  
And Its Science Applications*

Funded through The Science of Aqua and Terra (NNX11AE64G)

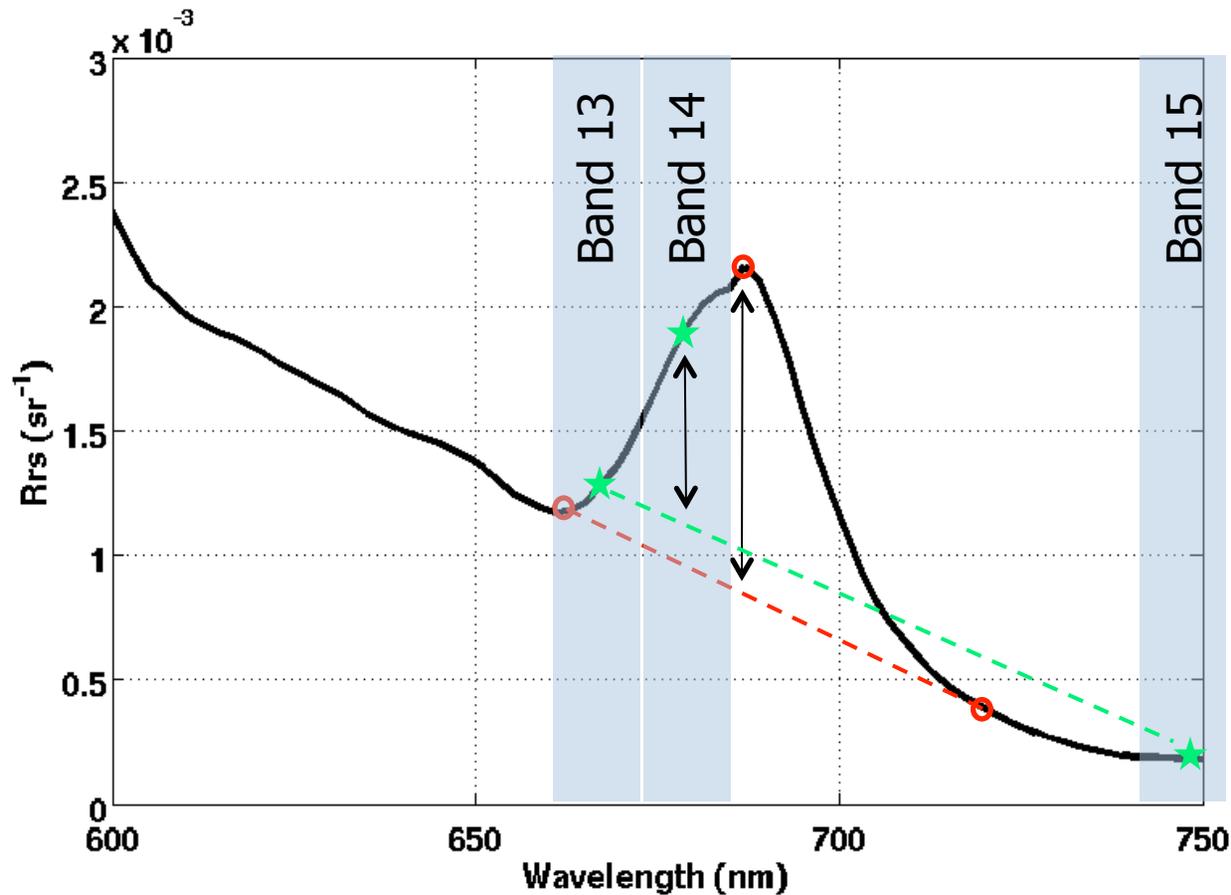
PI: Toby K. Westberry,

CoI's: Michael J. Behrenfeld, Allen J. Milligan



# MODIS Fluorescence Line Height (FLH)

- A geometric definition
- Can be related to total fluoresced flux (e.g., Huot et al., 2005)



$$F_{\text{sat}} = L_V$$

# Fluorescence Basics

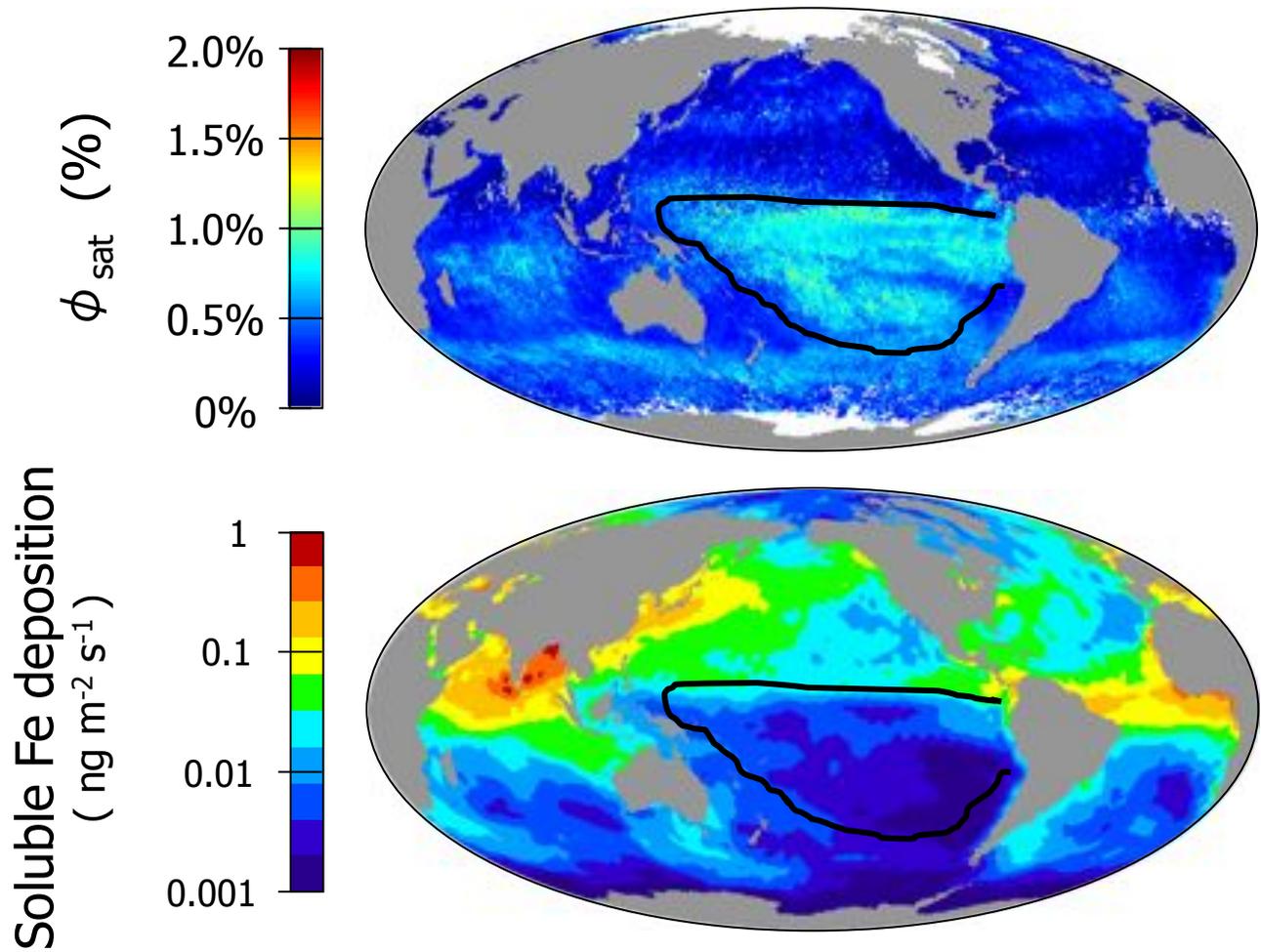
Three primary factors regulate global phytoplankton fluorescence distributions:

- (1) pigment concentrations
- (2) “pigment packaging”, a self-shading phenomenon influencing light absorption efficiencies (Duysens 1956; Bricaud et al., 1995, 1998).
- (3) a photoprotective response aimed at preventing high-light damage (i.e., “nonphotochemical quenching”, NPQ)

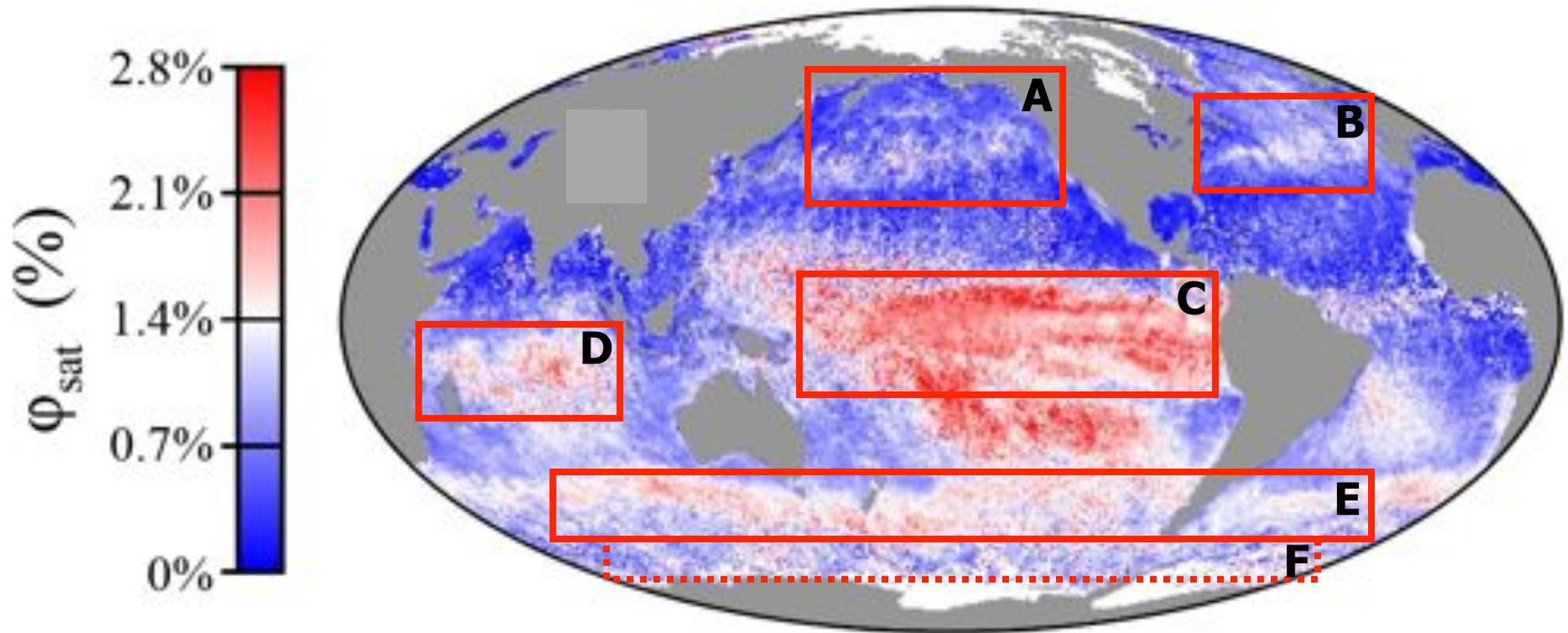


# Fluorescence Quantum Yields ( $\phi$ , or FQY)

***Spring 2004***



# Fluorescence Quantum Yields ( $\phi$ , or FQY)



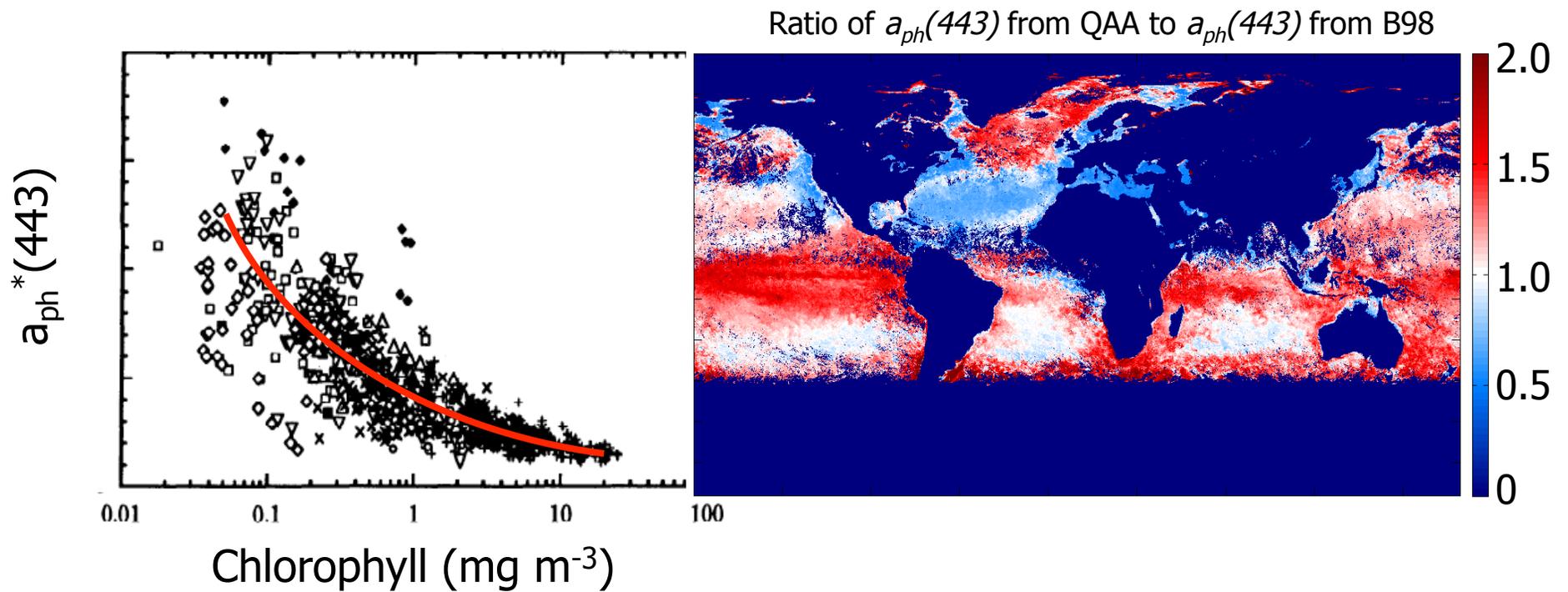
**Figure 3.** Global climatological  $\phi$ , calculated from 2004-2005 Aqua MODIS *FLH*. Some HNLC regions (C, E) exhibit elevated  $\phi$ , while others do not, such as the subarctic NE Pacific (A) and high latitude Southern Ocean (F). Conversely, non-HNLC regions also exhibit elevated  $\phi$  and are suggested to be driven by iron limitation (D) or other factors (B).

# Main Proposed Tasks

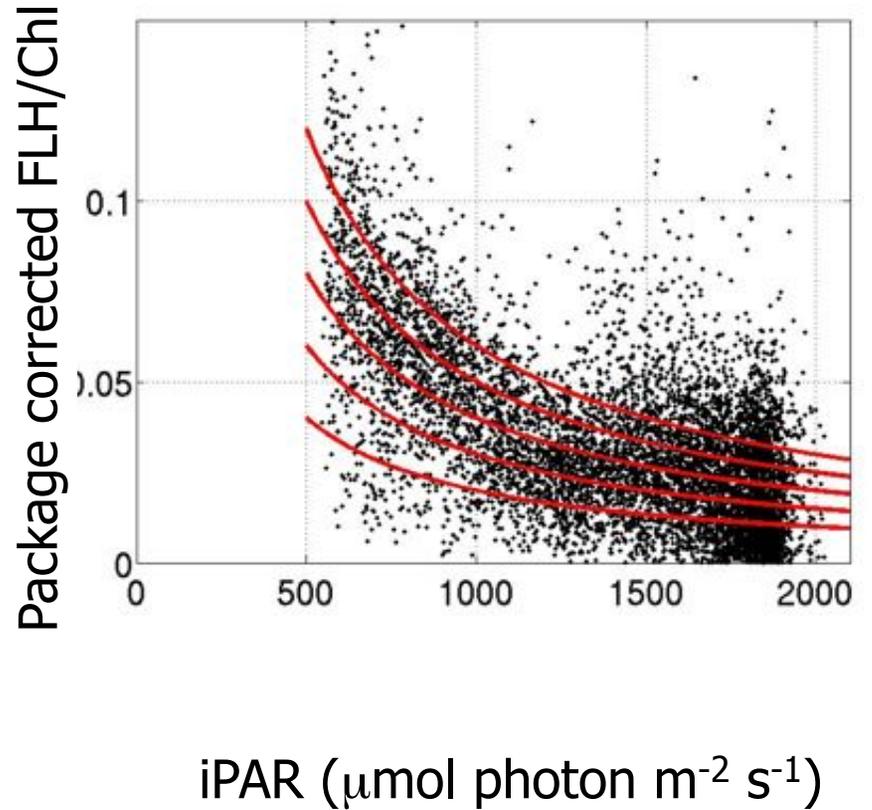
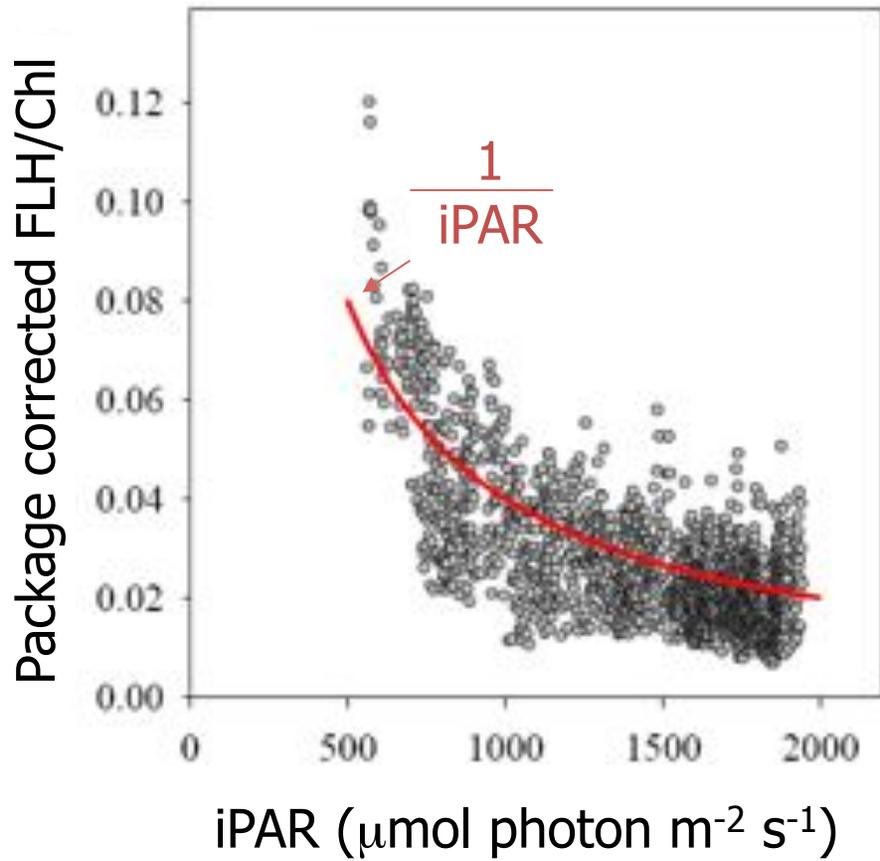
1. Re-evaluate and compare alternative corrections for pigment packaging using results from semi-analytic inversion models
2. Determine appropriate NPQ correction from *FLH*, *iPAR* data
3. Develop an adequate correction for retrieved fluorescence yields from phytoplankton communities acclimated to different light environments
4. Examine mission time series of *FLH*-derived products for long term variations and correspondence with independent global environmental indices

# Pigment Packaging

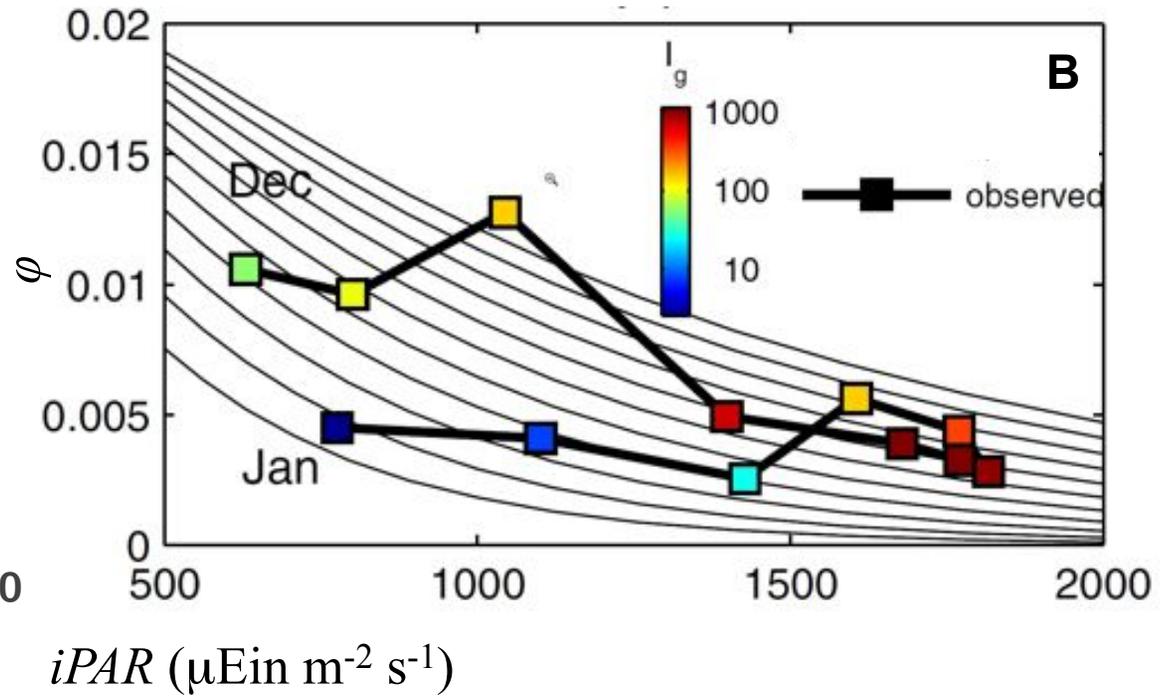
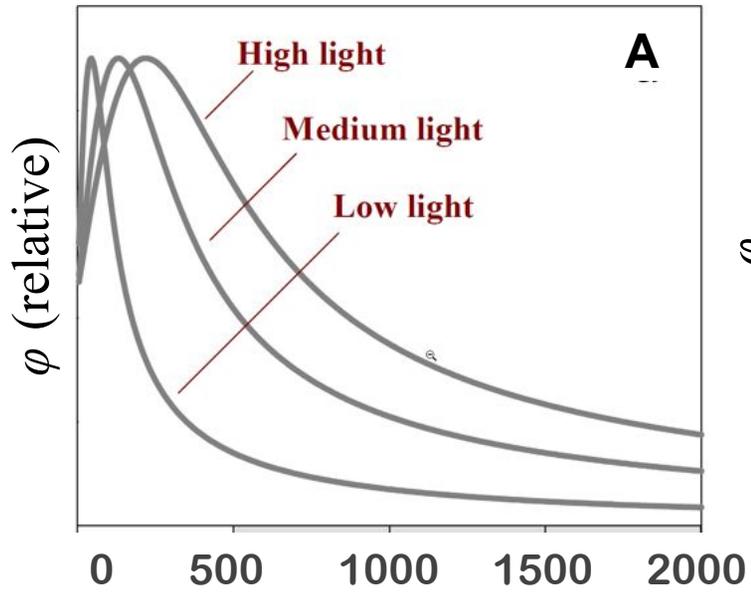
- We currently use Bricaud et al. (1998)
- Differences have and “oceanographic” looking pattern



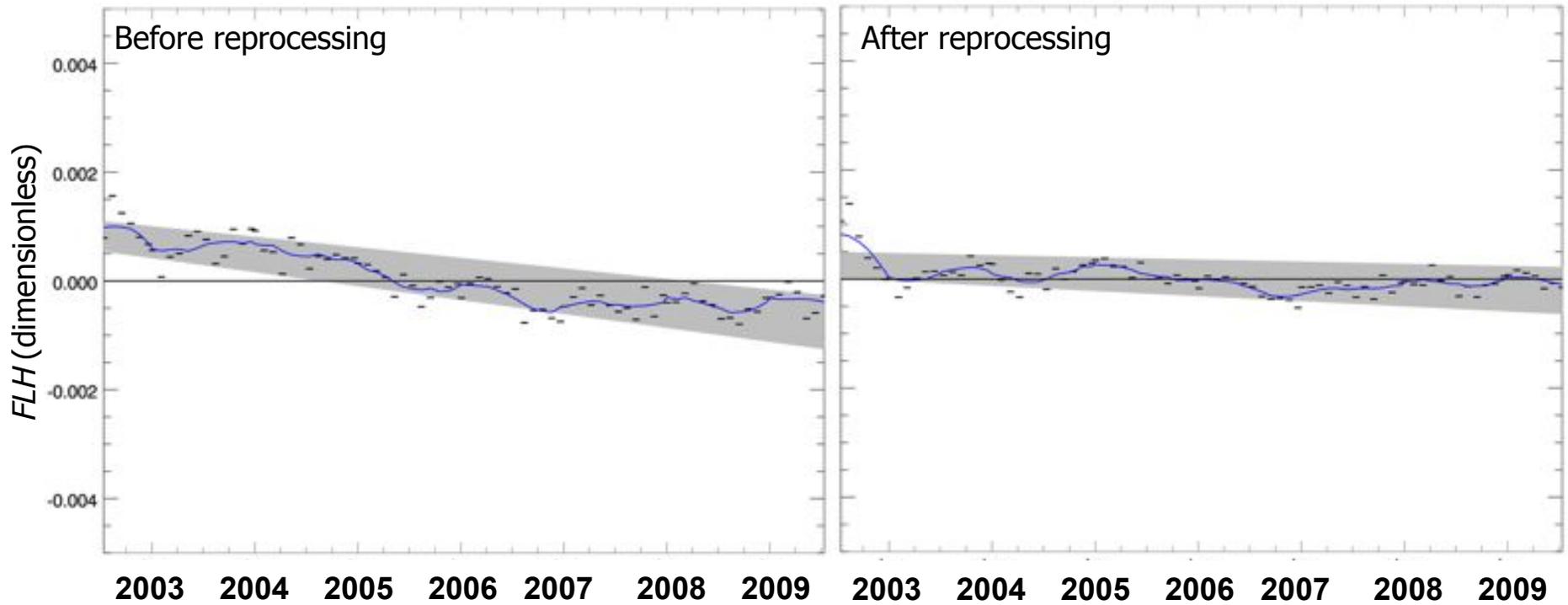
# Non-photochemical quenching (NPQ)



# Photoacclimation



# FLH trends



- Removal of calibration related trends allows us to look for “real” climate signals

End